

## PCT

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference SC/ar981040WO	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) <b>FOR FURTHER ACTION</b>	
International application No. PCT/EP00/00116	International filing date (day/month/year) 11/01/2000	Priority date (day/month/year) 22/01/1999
International Patent Classification (IPC) or national classification and IPC H04Q11/04		
Applicant NOKIA NETWORKS OY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  17/08/2000	Date of completion of this report  11.04.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer  Lindner, A  Telephone No. +31 70 340 3485 

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/00116

## I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:

### Description, pages:

1-22 as originally filed

### Claims, No.:

1-26 as originally filed

27-36 as received on 12/01/2001 with letter of 11/01/2001

### Drawings, sheets:

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/00116

- ☐ the description,      pages:
- ☐ the claims,      Nos.:
- ☐ the drawings,      sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

### III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
- ☒ claims Nos. 23-26,35,36.

because:

- ☒ the said international application, or the said claims Nos. 23-26,35,36 relate to the following subject matter which does not require an international preliminary examination (*specify*):  
**see separate sheet**

- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

- ☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination report cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

- ☐ the written form has not been furnished or does not comply with the standard.
- ☐ the computer readable form has not been furnished or does not comply with the standard.

### V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/00116

## 1. Statement

Novelty (N)	Yes:	Claims	1-22,27-34
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-22,27-34
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-22,27-34
	No:	Claims	

## 2. Citations and explanations **see separate sheet**

## VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/EP00/00116

**Re Item III**

**Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

Independent claim 23 does not meet the requirement of Rule 67.1(v) PCT since its subject matter defines a format for an ATM cell, and hence contains features referring to a mere representation of information, as opposed to **technical** features referring to a product (e.g. apparatus) or process (see Administrative Instructions under the PCT 01.07.1998, section IV, Annex B, Part 1, (e)). Therefore, an opinion with regard to novelty and inventive step cannot be established (Article 34(4)(a)(i) PCT). The same applies to dependent claims 24-26, as well as claims 35 and 36 (use of such ATM cell).

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. State of the art:**

The document US5812550 (Sohn et al) represents the closest prior art and discloses a method and arrangement for writing data into, and reading data out of, registers using ATM cells performing network management functions.

**2. Statement of the problem:**

No prior art document suggests or hints at the problem of high hardware complexity of management networks which have to be connected to hundreds of interface units.

**3. Solution of the problem:**

No prior Art document discloses or hints at integrating instructions, associated with Management units, in the form of operation codes placed in the payload of ATM cells, as defined by the combination of the features of independent claims 1,2,14,19,27 and 31. This solution has the advantage of reducing the total cost of such ATM systems.

Thus, the requirements of novelty (Art. 33 (2) PCT), inventive step (Art. 33 (3) PCT) and industrial applicability (Art. 33 (4) PCT) are all met regarding the above-mentioned independent claims. This applies also to dependent claims 3-13, 15-18,20-22, 28-30 and 32-34.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/EP00/00116

Support for the newly filed claims 27 and 31 may be found in the description, p.16, paragraph 5, p.17, paragraph 7 and p.18, paragraph 1 - p.19, paragraph 5.

**Re Item VII**

**Certain defects in the international application**

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document US 5 812559 (Sohn et al) is not mentioned in the description, nor is this document identified therein.

## New Claims 27 to 36 (January 11, 2001)

27. A method for constructing an ATM cell comprising a cell header of 5 bytes and a payload space of 48 bytes, said cell being used for transmitting management data between a management unit (1) with access to an ATM network and at least one device (4), with said device (4) comprising registers into which data is to be written and/or from which data is to be read out, and a management interface (6) by way of which a control unit (5) has access to the registers of the device (4), with the control unit (5) furthermore having access to a data path interface (7) of an ATM network, and being suitable for receiving certain ATM cells composed by a management unit (1) via the data path interface (7), said data being destined for the control unit (5), and from the payload of these cells to extract individual instructions associated with a particular device (4), in particular reading and/or writing of register data into the devices (4) or from the devices (4), and to extract associated information and carry it out in respect of the particular device (4), with the payload space of the ATM cell comprising instruction blocks and a supplementary block (trailer), the method comprising the steps of:
- inserting into the instruction blocks bits for an operation code which identifies an instruction type such as read, write, no operation;

- 2 -

- inserting into the instruction blocks bits for identification of a device (4) to which the instruction in the instruction block is directed;
- inserting into the instruction blocks bits which are associated with particular registers integrated in the identified device (4);
- inserting into the instruction blocks bits for data required for carrying out the instruction,
- inserting into the supplementary block bits for identifying the cell type, such as new cell or a retransmitted cell;
- inserting into the supplementary block a sequential bit which is toggled with each composition of a new cell which does not constitute a repetition;
- inserting into the supplementary block bits for interrupt information; and
- inserting in the supplementary block bits for a checksum.

28. A method according to claim 27,  
c h a r a c t e r i s e d i n t h a t  
11 instruction blocks and a supplementary block of 4  
bytes each are used in each payload space for  
inserting the bits.

29. A method according to claim 28,



- 3 -

characterised in that into the 11 instruction blocks the following number of bits are inserted:

- for the operation code 2 bits;
- for identification of the device (4) 3 - 5 bits and, supplementing to 5 bits for reserve, 0 - 2 bits;
- for allocation of the registers 17 bits;
- for the data required to carry out a respective instruction 1 byte;

and that into the supplementary block, the following number of bits are inserted:

- for identification of the cell type 1 bit;
- as a sequential bit 1 bit;
- additionally as a reserve 5 bits;
- for the interrupt information 1 byte; and
- for the checksum, formed by a cyclic redundancy check (CRC), 10 bits.

30. A method according to one of claims 27 - 29, characterised in that a "big endian order" is used for the ATM cell.

- 4 -

31. A management unit for constructing an ATM cell comprising a cell header of 5 bytes and a payload space of 48 bytes, said cell being used for transmitting management data between said management unit (1) with access to an ATM network and at least one device (4), with said device (4) comprising registers into which data is to be written and/or from which data is to be read out, and a management interface (6) by way of which a control unit (5) has access to the registers of the device (4), with the control unit (5) furthermore having access to a data path interface (7) of an ATM network, and being suitable for receiving certain ATM cells composed by a management unit (1) via the data path interface (7), said data being destined for the control unit (5), and from the payload of these cells to extract individual instructions associated with a particular device (4), in particular reading and/or writing of register data into the devices (4) or from the devices (4), and to extract associated information and carry it out in respect of the particular device (4), with the payload space of the ATM cell comprising instruction blocks and a supplementary block (trailer), the management unit (1) comprising means for:

- inserting into the instruction blocks bits for an operation code which identifies an instruction type such as read, write, no operation;
- inserting into the instruction blocks bits for identification of a device (4) to which the instruction in the instruction block is directed;

- 5 -

- inserting into the instruction blocks bits which are associated with particular registers integrated in the identified device (4);
  - inserting into the instruction blocks bits for data required for carrying out the instruction,
  - inserting into the supplementary block bits for identifying the cell type, such as new cell or a retransmitted cell;
  - inserting into the supplementary block a sequential bit which is toggled with each composition of a new cell which does not constitute a repetition;
  - inserting into the supplementary block bits for interrupt information; and for
  - inserting into the supplementary block bits for a checksum.
32. A management unit according to claim 31, characterised in that the means are suited to insert said bits into 11 instruction blocks and a supplementary block of 4 bytes each in each payload space.
33. Management unit according to claim 32, characterised in that the means are suited for inserting into the 11 instruction blocks:

- 6 -

- for the operation code 2 bits;
- for identification of the device (4) 3 - 5 bits  
and, supplementing to 5 bits for reserve, 0 - 2  
bits;
- for allocation of the registers 17 bits;
- for the data required to carry out a respective  
instruction 1 byte;

and that the means are suited for inserting into the  
supplementary block:

- for identification of the cell type 1 bit;
- as a sequential bit 1 bit;
- additionally as a reserve 5 bits;
- for the interrupt information 1 byte; and
- for the checksum, formed by a cyclic redundancy  
check (CRC), 10 bits.

34. Management unit according to one of claims 31 - 33,  
c h a r a c t e r i s e d i n t h a t  
the means are suited for using a "big endian order".

35. The use of an ATM cell according to one of claims 23  
- 34 for configuring ATM interface units (4) of the  
physical layer.

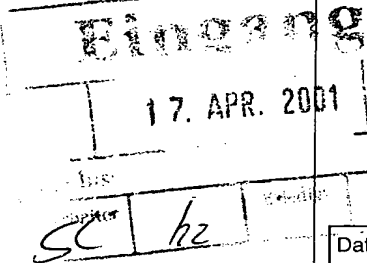
36. The use of an ATM cell according to one of claims 23 - 34 for the reading out of data, available in the ATM interface units (4) of the physical layer, in particular register values.

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

COHAUSZ & FLORACK  
Kanzlerstrasse 8a  
D-40472 Düsseldorf  
ALLEMAGNE



## PCT

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT  
(PCT Rule 71.1)

Date of mailing  
(day/month/year) 11.04.2001

Applicant's or agent's file reference  
SC/ar981040WO

### IMPORTANT NOTIFICATION

International application No.  
PCT/EP00/00116

International filing date (day/month/year)  
11/01/2000

Priority date (day/month/year)  
22/01/1999

Applicant  
NOKIA NETWORKS OY et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

#### 4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



European Patent Office - P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk - Pays Bas  
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl  
Fax: +31 70 340 - 3016

Authorized officer

Smits, A

Tel. +31 70 340-3596



# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference SC/ar981040WO	<b>FOR FURTHER ACTION</b>		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP00/00116	International filing date ( <i>day/month/year</i> ) 11/01/2000	Priority date ( <i>day/month/year</i> ) 22/01/1999	
International Patent Classification (IPC) or national classification and IPC H04Q11/04			
Applicant NOKIA NETWORKS OY et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  17/08/2000	Date of completion of this report  11.04.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer  Lindner, A  Telephone No. +31 70 340 3485 <div style="text-align: right;">  </div>

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/00116

## I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:

### Description, pages:

1-22 as originally filed

### Claims, No.:

1-26 as originally filed

27-36 as received on 12/01/2001 with letter of 11/01/2001

### Drawings, sheets:

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:



## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/00116

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

### III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
- ☒ claims Nos. 23-26,35,36.

because:

- ☒ the said international application, or the said claims Nos. 23-26,35,36 relate to the following subject matter which does not require an international preliminary examination (*specify*):  
**see separate sheet**
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination report cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

- ☐ the written form has not been furnished or does not comply with the standard.
- ☐ the computer readable form has not been furnished or does not comply with the standard.

### V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/00116

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## 1. Statement

Novelty (N)	Yes:	Claims	1-22,27-34
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-22,27-34
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-22,27-34
	No:	Claims	

## 2. Citations and explanations **see separate sheet**

## VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

---

International application No. PCT/EP00/00116

**Re Item III**

**Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

Independent claim 23 does not meet the requirement of Rule 67.1(v) PCT since its subject matter defines a format for an ATM cell, and hence contains features referring to a mere representation of information, as opposed to **technical** features referring to a product (e.g. apparatus) or process (see Administrative Instructions under the PCT 01.07.1998, section IV, Annex B, Part 1, (e)). Therefore, an opinion with regard to novelty and inventive step cannot be established (Article 34(4)(a)(i) PCT). The same applies to dependent claims 24-26, as well as claims 35 and 36 (use of such ATM cell).

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. State of the art:**

The document US5812550 (Sohn et al) represents the closest prior art and discloses a method and arrangement for writing data into, and reading data out of, registers using ATM cells performing network management functions.

**2. Statement of the problem:**

No prior art document suggests or hints at the problem of high hardware complexity of management networks which have to be connected to hundreds of interface units.

**3. Solution of the problem:**

No prior Art document discloses or hints at integrating instructions, associated with Management units, in the form of operation codes placed in the payload of ATM cells, as defined by the combination of the features of independent claims 1,2,14,19,27 and 31. This solution has the advantage of reducing the total cost of such ATM systems.

Thus, the requirements of novelty (Art. 33 (2) PCT), inventive step (Art. 33 (3) PCT) and industrial applicability (Art. 33 (4) PCT) are all met regarding the above-mentioned independent claims. This applies also to dependent claims 3-13, 15-18,20-22, 28-30 and 32-34.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/EP00/00116

Support for the newly filed claims 27 and 31 may be found in the description, p.16, paragraph 5, p.17, paragraph 7 and p.18, paragraph 1 - p.19, paragraph 5.

**Re Item VII**

**Certain defects in the international application**

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document US 5 812559 (Sohn et al) is not mentioned in the description, nor is this document identified therein.

## New Claims 27 to 36 (January 11, 2001)

27. A method for constructing an ATM cell comprising a cell header of 5 bytes and a payload space of 48 bytes, said cell being used for transmitting management data between a management unit (1) with access to an ATM network and at least one device (4), with said device (4) comprising registers into which data is to be written and/or from which data is to be read out, and a management interface (6) by way of which a control unit (5) has access to the registers of the device (4), with the control unit (5) furthermore having access to a data path interface (7) of an ATM network, and being suitable for receiving certain ATM cells composed by a management unit (1) via the data path interface (7), said data being destined for the control unit (5), and from the payload of these cells to extract individual instructions associated with a particular device (4), in particular reading and/or writing of register data into the devices (4) or from the devices (4), and to extract associated information and carry it out in respect of the particular device (4), with the payload space of the ATM cell comprising instruction blocks and a supplementary block (trailer), the method comprising the steps of:
- inserting into the instruction blocks bits for an operation code which identifies an instruction type such as read, write, no operation;

- 2 -

- inserting into the instruction blocks bits for identification of a device (4) to which the instruction in the instruction block is directed;
- inserting into the instruction blocks bits which are associated with particular registers integrated in the identified device (4);
- inserting into the instruction blocks bits for data required for carrying out the instruction,
- inserting into the supplementary block bits for identifying the cell type, such as new cell or a retransmitted cell;
- inserting into the supplementary block a sequential bit which is toggled with each composition of a new cell which does not constitute a repetition;
- inserting into the supplementary block bits for interrupt information; and
- inserting in the supplementary block bits for a checksum.

28. A method according to claim 27,  
c h a r a c t e r i s e d i n t h a t  
11 instruction blocks and a supplementary block of 4  
bytes each are used in each payload space for  
inserting the bits.

29. A method according to claim 28,

- 3 -

c h a r a c t e r i s e d i n t h a t  
into the 11 instruction blocks the following number  
of bits are inserted:

- for the operation code 2 bits;
- for identification of the device (4) 3 - 5 bits  
and, supplementing to 5 bits for reserve, 0 - 2  
bits;
- for allocation of the registers 17 bits;
- for the data required to carry out a respective  
instruction 1 byte;

and that into the supplementary block, the following  
number of bits are inserted:

- for identification of the cell type 1 bit;
- as a sequential bit 1 bit;
- additionally as a reserve 5 bits;
- for the interrupt information 1 byte; and
- for the checksum, formed by a cyclic redundancy  
check (CRC), 10 bits.

30. A method according to one of claims 27 - 29,  
c h a r a c t e r i s e d i n t h a t  
a "big endian order" is used for the ATM cell.

- 4 -

31. A management unit for constructing an ATM cell comprising a cell header of 5 bytes and a payload space of 48 bytes, said cell being used for transmitting management data between said management unit (1) with access to an ATM network and at least one device (4), with said device (4) comprising registers into which data is to be written and/or from which data is to be read out, and a management interface (6) by way of which a control unit (5) has access to the registers of the device (4), with the control unit (5) furthermore having access to a data path interface (7) of an ATM network, and being suitable for receiving certain ATM cells composed by a management unit (1) via the data path interface (7), said data being destined for the control unit (5), and from the payload of these cells to extract individual instructions associated with a particular device (4), in particular reading and/or writing of register data into the devices (4) or from the devices (4), and to extract associated information and carry it out in respect of the particular device (4), with the payload space of the ATM cell comprising instruction blocks and a supplementary block (trailer), the management unit (1) comprising means for:

- inserting into the instruction blocks bits for an operation code which identifies an instruction type such as read, write, no operation;
- inserting into the instruction blocks bits for identification of a device (4) to which the instruction in the instruction block is directed;



- 5 -

- inserting into the instruction blocks bits which are associated with particular registers integrated in the identified device (4);
- inserting into the instruction blocks bits for data required for carrying out the instruction,
- inserting into the supplementary block bits for identifying the cell type, such as new cell or a retransmitted cell;
- inserting into the supplementary block a sequential bit which is toggled with each composition of a new cell which does not constitute a repetition;
- inserting into the supplementary block bits for interrupt information; and for
- inserting into the supplementary block bits for a checksum.

32. A management unit according to claim 31, characterised in that the means are suited to insert said bits into 11 instruction blocks and a supplementary block of 4 bytes each in each payload space.
33. Management unit according to claim 32, characterised in that the means are suited for inserting into the 11 instruction blocks:

- 6 -

- for the operation code 2 bits;
- for identification of the device (4) 3 - 5 bits  
and, supplementing to 5 bits for reserve, 0 - 2  
bits;
- for allocation of the registers 17 bits;
- for the data required to carry out a respective  
instruction 1 byte;

and that the means are suited for inserting into the  
supplementary block:

- for identification of the cell type 1 bit;
- as a sequential bit 1 bit;
- additionally as a reserve 5 bits;
- for the interrupt information 1 byte; and
- for the checksum, formed by a cyclic redundancy  
check (CRC), 10 bits.

34. Management unit according to one of claims 31 - 33,  
c h a r a c t e r i s e d i n t h a t  
the means are suited for using a "big endian order".
35. The use of an ATM cell according to one of claims 23  
- 34 for configuring ATM interface units (4) of the  
physical layer.

- 7 -

36. The use of an ATM cell according to one of claims 23 - 34 for the reading out of data, available in the ATM interface units (4) of the physical layer, in particular register values.

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>SC/wa 981040W0</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/EP 00/ 00116</b>	International filing date (day/month/year) <b>11/01/2000</b>	(Earliest) Priority Date (day/month/year) <b>22/01/1999</b>
Applicant <b>NOKIA NETWORKS OY et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

### 1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

### 4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

**A PROCESS AND UNIT FOR CONFIGURING OR MONITORING ATM DEVICES COMPRISING REGISTER**

### 5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

2



None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP 00/00116

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q11/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 812 550 A (DOH YOON MI ET AL) 22 September 1998 (1998-09-22)  column 5, line 12 -column 9, line 11 -----	1,2,14, 19,23, 27,28

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

15 May 2000

Date of mailing of the international search report

23/05/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Lindner, A

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 00/00116

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5812550 A	22-09-1998	KR 157152 B	16-11-1998
		JP 2837660 B	16-12-1998
		JP 9200230 A	31-07-1997
<hr/>			

# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum) SC/wa 981040WO

### Box No. I TITLE OF INVENTION

A process for configuring or monitoring devices comprising registers as well as a control unit and an ATM cell

### Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Nokia Networks Oy  
Keilalahdentie 4  
FI-02150 Espoo

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:

FI

State (that is, country) of residence:

FI

This person is applicant  
for the purposes of:

☐ all designated  
States

☒ all designated States except  
the United States of America

☐ the United States  
of America only

☐ the States indicated in  
the Supplemental Box

### Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

STORCK, Hubertus  
Thomastr. 4  
D-30177 Hannover

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box  
is marked, do not fill in below.)

State (that is, country) of nationality:

DE

State (that is, country) of residence:

DE

This person is applicant  
for the purposes of:

☐ all designated  
States

☐ all designated States except  
the United States of America

☒ the United States  
of America only

☐ the States indicated in  
the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

### Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf  
of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

COHAUSZ & FLORACK  
Patent- und Rechtsanwälte (24)

Kanzlerstrasse 8a  
40472 Düsseldorf  
Deutschland

Telephone No.

0211 / 90 490 0

Facsimile No.

0211 / 90 490 49

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

**Box No.V DESIGNATION OF STATES**

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

**Regional Patent**


- ☒ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

**National Patent (if other kind of protection or treatment desired, specify on dotted line):**

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| <input checked="" type="checkbox"/> <b>AE</b> United Arab Emirates                  | <input checked="" type="checkbox"/> <b>LR</b> Liberia  |
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| <input checked="" type="checkbox"/> <b>IS</b> Iceland                               |  |
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| <input checked="" type="checkbox"/> <b>KP</b> Democratic People's Republic of Korea | <input checked="" type="checkbox"/> <b>ZA</b> South Africa   |
|   | <input checked="" type="checkbox"/> <b>ZW</b> Zimbabwe   |
| <input checked="" type="checkbox"/> <b>KR</b> Republic of Korea                     | Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet: |
| <input checked="" type="checkbox"/> <b>KZ</b> Kazakhstan                            | <input checked="" type="checkbox"/> <b>DM</b> Dominica AND <b>TZ</b> United Republic of Tanzania             |
| <input checked="" type="checkbox"/> <b>LC</b> Saint Lucia                           | <input checked="" type="checkbox"/> <b>CR</b> Costa Rica AND <b>MA</b> Morocco                               |
| <input checked="" type="checkbox"/> <b>LK</b> Sri Lanka                             |  |

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)



<b>Box No. VI PRIORITY CLAIM</b>		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1) 22.01.1999	199 02 436.7	Germany		
item (2)				
item (3)				
<input type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):				
<small>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</small>				
<b>Box No. VII INTERNATIONAL SEARCHING AUTHORITY</b>				
<b>Choice of International Searching Authority (ISA)</b> <small>(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):</small>		<b>Request to use results of earlier search; reference to that search</b> (if an earlier search has been carried out by or requested from the International Searching Authority):		
ISA /		Date (day/month/year)	Number	Country (or regional Office)
<b>Box No. VIII CHECK LIST; LANGUAGE OF FILING</b>				
This international application contains the following number of sheets: request : description (excluding sequence listing part) : claims : abstract : drawings : sequence listing part of description : Total number of sheets :		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input checked="" type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):		
Figure of the drawings which should accompany the abstract: 2		Language of filing of the international application: English		
<b>Box No. IX SIGNATURE OF APPLICANT OR AGENT</b>				
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).				
 Dr. Ralph Schippan, Patent Attorney(24)				

For receiving Office use only	
1. Date of actual receipt of the purported international application:	2. Drawings:  <input type="checkbox"/> received:  <input type="checkbox"/> not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA /	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

For International Bureau use only
Date of receipt of the record copy by the International Bureau:

This sheet is not part of and does not count as a sheet of the international application.

PCT

FEE CALCULATION SHEET

Annex to the Request

For receiving Office use only

International application No.

Applicant's or agent's  
file reference

SC/wa 981040W0

Date stamp of the receiving Office

Applicant

Nokia Networks Oy

CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE . . . . . EUR 102,-- T

2. SEARCH FEE . . . . . EUR 945,-- S

International search to be carried out by \_\_\_\_\_  
(If two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

Basic Fee

The international application contains 39 sheets.

first 30 sheets . . . . . EUR 409,-- b1

9 x 9 = EUR 81,-- b2

remaining sheets additional amount

Add amounts entered at b1 and b2 and enter total at B . . . . . EUR 490,-- B

Designation Fees

The international application contains 81 designations.

8 x 88,-- = EUR 704,-- D

number of designation fees payable (maximum 10) amount of designation fee

Add amounts entered at B and D and enter total at I . . . . . EUR 1.194,-- I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D.)

4. FEE FOR PRIORITY DOCUMENT (if applicable) . . . . . P

5. TOTAL FEES PAYABLE . . . . . EUR 2.241,--

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL

☐ The designation fees are not paid at this time.

MODE OF PAYMENT

☒ authorization to charge  
deposit account (see below)

☐ bank draft

☐ coupons

☐ cheque

☐ cash

☐ other (specify):

☐ postal money order

☐ revenue stamps

DEPOSIT ACCOUNT AUTHORIZATION (this mode of payment may not be available at all receiving Offices)

The RO/ EPA ☒ is hereby authorized to charge the total fees indicated above to my deposit account.

☐ (this check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit) is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.

☐ is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International Bureau of WIPO to my deposit account.

28000261

10.01.2000

Dr. Ralph Schippan (24)

Deposit Account No.

Date (day/month/year)

Signature

- Patentanwalt (24)

# PATENT COOPERATION TREATY

PCT

## NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:	
COHAUSZ & FLORACK	
Kanzlerstrasse 3a	
D-40472 Düsseldorf	
ALLEMAGNE	
04. AUG. 2000	
Frist	
Bearbeitet	Erledigt

Date of mailing (day/month/year) 27 July 2000 (27.07.00)		IMPORTANT NOTICE	
Applicant's or agent's file reference SC/wa 981040WO			
International application No. PCT/EP00/00116	International filing date (day/month/year) 11 January 2000 (11.01.00)	Priority date (day/month/year) 22 January 1999 (22.01.99)	
Applicant NOKIA NETWORKS OY et al			

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:  
AU,JP,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:  
AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CN,CR,CU,CZ,DE,DK,DM,EA,EE,EP,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW  
The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 27 July 2000 (27.07.00) under No. WO 00/44193

### REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

### REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

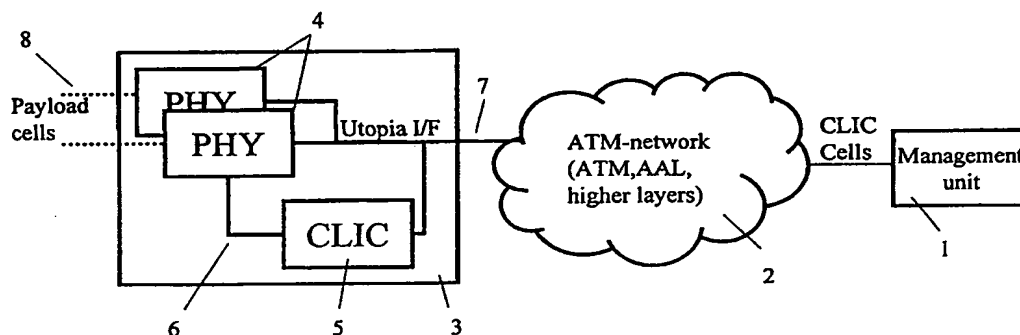
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer J. Zahra
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/EP00/00116 <b>(22) International Filing Date:</b> 11 January 2000 (11.01.00) <b>(30) Priority Data:</b> 199 02 436.7      22 January 1999 (22.01.99)      DE <b>(71) Applicant (for all designated States except US):</b> NOKIA NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> STORCK, Hubertus [DE/DE]; Füllenbachstrasse 5, D-40474 Düsseldorf (DE). <b>(74) Agent:</b> COHAUSZ & FLORACK; Kanzlerstrasse 8a, D-40472 Düsseldorf (DE).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

**(54) Title:** A PROCESS AND UNIT FOR CONFIGURING OR MONITORING ATM DEVICES COMPRISING REGISTERS

**(57) Abstract**

The invention relates to a process for writing data into registers of at least one device (4) comprising a management interface (6), or a process for reading values from registers of such devices (4). To provide an option for particularly inexpensive reading or writing of data, communication between at least one management unit (1) which generates the data to be written or which undertakes further processing of read-out data, and the control units (5) by means of the ATM inband protocol, is proposed. The control units (5) which have access to the registers of at least one of the devices (4) by way of the management interface (6), receive ATM cells addressed to them from the management unit (1), with instructions and information for specific devices (4) connected to the respective control unit (5) being integrated into the payload of said ATM cells. The control units (5) carry out the instructions and if applicable transmit a response ATM cell back to the management unit (1). The invention also relates to a control unit as well as an ATM cell for carrying out read and write operations by means of the inband protocol.

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# A PROCESS AND UNIT FOR CONFIGURING OR MONITORING ATM DEVICES COMPRISING REGISTERS

The invention relates to a process for configuring or reading-out data from devices comprising registers. The invention also relates to a control unit and its integration into a management system for an ATM network for configuring and/or monitoring such devices, as well as an ATM cell.

With an ATM network, data streams of various telecommunication services requiring different bit rates can be transmitted. According to the ATM concept, ATM cells of equal length are formed from various data streams with a digital transmission path which is the same at least across some sections. The structure of the ATM cells is standardised. The cells comprise a cell header of 5 bytes with control information and a payload space of 48 bytes. The control information among other things comprises details concerning the path which the respective cell has to take. Certain ATM service types have been introduced so as to fulfil the requirements of all telecommunication services in ATM networks. The ATM reference model represents the basis for describing these service types.

The ATM reference model is based on the principles of the OSI reference model; it is composed of a user plane, a control plane and a management plane (Gerd Siegmund: "ATM - The technology" 3rd edition Hüthig Publications, Verlag

Heidelberg, pp. 91 - 92. [The aforementioned publication is in the German language, its original title being "ATM - Die Technik".] Figure 1 shows this reference model where the user plane is further divided into the layers "physical layer", "ATM layer", "adaptation layer" and "higher layers for user data", with these layers having to be able to communicate with each other by way of suitable interfaces.

Interface units PHY which permit data transfer tailored to the respective transmission medium, form part of the physical layer.

Utopia Level 2 (The ATM Forum, Technical Committee: Utopia Level 2, Version 1.0 af-phy-0039.000, June 1995) provides a specification of the data path interface between the ATM layer and the interface unit PHY of the physical layer.

An ATM network can contain various devices which, as is the case with the interface units PHY of the physical layer, comprise registers and require a configuration and/or continuous monitoring of register values. For this reason, such devices must provide access for a management device via which configuration and/or monitoring is made possible.

Thus according to the UTOPIA level 2 specification, each of the interface units PHYs comprises a management interface (shown in Appendix 2) which is used by a management unit for configuring, administering and monitoring one or several PHYs. This management interface is in particular configured as a microprocessor interface.

Appendix 2 of Utopia Level 2 proposes a concrete design of management interfaces for interface units PHYs as a guideline for users. Usually this design is used. For example, in the case of a parallel interface, information is provided concerning required and optional interface signals as well as operations and read cycles.

If a management unit is to have access to several devices via its management interface, then connections between the management unit and all these devices must be established by using a bus. For example, an ATM network can comprise hundreds of interface units PHY, leading to considerable costs for these additional management networks.

It is thus the object of the invention to provide an option, for devices associated with an ATM network and comprising registers, for particularly inexpensive reading or writing of data into these registers or from these registers.

According to the invention, this object is met by a process for writing data into registers of at least one device comprising a management interface, involving the following steps:

- composing ATM cells by at least one management unit, with the management unit addressing the ATM cells in each instance to a control unit linked to a data path interface, and integration of instructions associated with particular devices, e.g. writing of data into the registers of the devices, in the form of an operation code, together with the respective information into the payload of the ATM cells;



- transmitting the ATM cells to the addressed control unit via the respective data path interface;
- extracting the operation codes being associated with particular devices, and the associated information in the control unit contained in the payload of the ATM cell; and
- if after the operation code, data is to be entered, setting of the register values of the devices according to the information provided from the ATM cell for this.

This object is also met by a process for reading values from registers of a device comprising a management interface, involving the following steps:

- composing ATM cells by at least one management unit, with the management unit addressing the ATM cells in each instance to a control unit linked to a data path interface, and integrating instructions associated with particular devices, e.g. reading of data from the registers of the devices, in the form of an operation code, together with the respective information into the payload of the ATM cells;
- transmitting the ATM cells to the addressed control unit via the respective data path interface;
- extracting the operation codes being associated with particular devices, and the associated information in the control unit contained in the payload of the ATM cell; and
- if after the operation code, register values are to be read out from devices, reading of the register values

of the respective devices, integration of the read values into ATM cells with addressing to the management unit and transmission of the cells to the management unit.

Likewise, the object is met by a control unit which provides access to the management interface of at least one device comprising registers, as well as to an Utopia bus providing a data path interface of an ATM network, with the control unit being suitable for receiving ATM cells composed by a management unit and destined for the control unit, and extracting and carrying out individual instructions associated with a particular device, in particular reading and/or writing of register data into the devices or from the devices from the payload of these cells, and extracting them and carrying them out in respect of the respective device.

Finally, according to the invention, the object is also met by an ATM cell comprising a cell header of 5 bytes and a payload space of 48 bytes, said cell being used for transmitting management data between a management unit with access to an ATM network and at least one device, with said device comprising registers into which data is to be written and/or from which data is to be read out, and a management interface by way of which a control unit has access to the registers of the device, with the control unit furthermore having access to an Utopia bus providing a data path interface of an ATM network, and being suitable for receiving certain ATM cells composed by a management unit via the data path interface, said data being destined for the control unit, and from the payload of these cells to extract individual instructions associated with a particular device, in particular reading and/or writing of register data into the devices

or from the devices, and to extract associated information and carry it out in respect of the particular device, with the payload space of the ATM cell comprising instruction blocks in which respective bits are provided

- for an operation code which identifies an instruction type such as read, write, no operation;
- for identification of a device to which the instruction in the instruction block is directed;
- which are associated with particular registers integrated in the identified device; and
- for data required for carrying out the instruction;

and a supplementary block (trailer), in which bits are provided

- for identifying the cell type, such as a new cell or a retransmitted cell;
- as a sequential bit which is toggled with each composition of a new cell which does not constitute a repetition;
- for interrupt information; as well as
- for a checksum.

The process according to the invention, the control unit according to the invention and the ATM cell according to the invention provide the advantage in that they allow transmission of management information on the same paths as ATM data over the ATM network. Thus there is no need

for a communications network dedicated to the transfer of management information. This represents a considerable load alleviation for the system design. Thus an ATM inband protocol is used to transmit management information which is required for configuring and/or monitoring units comprising registers, with management interface.

For the processes according to the invention, for which in particular a combined use is provided, for configuring a device, in particular an interface device PHY, as well as for monitoring status conditions and error conditions, which are provided by the device, the management unit reads or writes the register in the device by using the inband protocol.

The ATM cell according to the invention, the processes according to the invention and the control unit according to the invention can be used for configuring, controlling or monitoring not only PHYs but any devices comprising a management interface, in particular a microprocessor interface. For example, memories, micro processors, ATM layer devices or register modules may be considered.

A VPI/VCI address of its own may be allocated to each control unit so that the management unit can address the ATM cells to the control units, as is provided by the processes according to the invention. In cases where the management unit communicates directly with the control unit via an Utopia bus, there is an alternative option of addressing the control unit via a reserved Utopia bus address of the data interface to which the control unit is connected. Analogously, addressing of the management unit takes place via the control unit for a reply via the

ATM address (VPI/VCI) of the management unit or via a reserved UTOPIA address.

In a preferred embodiment of the process the so-called "request-response" protocol is used with the basic operations read out/set. To this effect, each communication is initiated by the management unit by sending instructions to the control unit within the framework of an ATM cell. All cells are confirmed by a reply cell from the control unit to the management unit. In this, the reply cell represents a modified version of the original cell. For addressing with a UTOPIA address, the 5-byte cell header of the received ATM-cell is taken over for the answer cell; otherwise the respective VPI/VCI value of the management unit is set. Furthermore, the original payload of 48 bytes is copied. If the original ATM cell contained a read instruction, then the data read in according to the instructions are inserted into the areas of the response cell provided for this. Before the response cell is sent off, the CRC checksum is calculated anew and appended.

Advantageously, at least part of the contents updated in this way of the ATM cell to be transmitted back to the management unit, is stored in an intermediate memory in case it will be required later. In particular there is a provision for the contents of the entire ATM cell to be stored in the intermediate memory.

To ensure that only the instructions of properly transmitted ATM cells are being carried out, preferably the management unit must not send the next ATM cell to a particular control unit before it has received a response cell from it, or alternatively, before a defined time limit has been exceeded. The defined time limit depends

on the minimum time required for transmitting the cell, processing it in the control unit and transmitting back a response cell. During processing of a cell, the control unit ignores any further incoming cell.

If the specified time has been exceeded, the management unit transmits the ATM cell again. The cell should contain information from which the control unit can detect whether the cell received by the management unit is a cell that has been transmitted for the first time or a cell that has been transmitted repeatedly. Taking into account the last processed cell, the control unit analyses whether the instructions of the cell have already been processed and thus only the last response cell, separately stored in the intermediate memory, needs to be sent to the management unit anew, or whether first of all the instructions contained in the cell need to be carried out. Analyses as to whether or not the instructions of the first cell have already been processed are necessary because reading out register values representing counter readings usually results in the respective counters being reset. Thus these counter readings would no longer be available during renewed readout of the register and are only maintained via an intermediate memory in the control unit.

Preferably the control unit according to the invention is not only able to extract instructions and data from ATM cells received and to ensure that the instructions are carried out, but equally to compose an ATM cell with addressing to a management unit, using register data from devices to which the control unit has access, and to transmit it to the management unit.

Still further-reaching functions of the control unit are imaginable for the future. For example the control unit can autonomously and regularly carry out separately stored instructions based on the same instruction set used by the management unit, and it can independently initiate communication with the management unit by transmitting an ATM cell to said management unit. For example the reserved bits in the supplementary block or a value not otherwise used, of the operation code, can be used to make it possible for such a cell to be identified in the management unit. In this way, effective automatic periodic monitoring data acquisition can be achieved by which the load in the ATM network can also be reduced because there is no need to send recurring information to the devices comprising registers.

The control unit according to the invention should in particular be seen as a component of a management system for an ATM network for configuring and/or monitoring devices. Each of the devices can comprise registers as well as a management interface (in particular, the management interface proposed in Appendix 2 of Utopia Level 2). Apart from the control unit, the management system comprises at least one management unit. The management unit generates the configuration data for the devices and/or processes the values which can be derived from the registers of the devices. In both cases, the management unit provides instructions for those devices which are to be configured or from whose registers values are to be read-out. Subsequently, the instructions and, if need be, the data are composed in the management unit for one or several devices to which the same control unit has access. Such composition occurs as a payload of an ATM cell, with the ATM cell being addressed to the respective control unit.

In a preferred embodiment the control unit has access to more than one device. If the devices are interface devices which provide access to the physical layers of an ATM network, in particular PHYs, then it makes sense if one control device has access to all interface units which are addressable by the data interface with which the control unit is connected. Based on the UTOPIA Level 2 specification, this can be up to 31 interface units.

A preferred division of the payload space of the ATM cell according to the invention consists of providing 4 bytes both for the instruction blocks and for the supplementary block as this provides the necessary and at the same time adequate capacity for the individual spaces. In this way 11 instruction blocks can be transmitted by one ATM cell.

For each of the instruction blocks in the payload space, the ATM cell according to the invention provides space for an operation code with which the command type is determined which is allocated to the respective instruction block. It is advantageous if 2 bits are allocated to the operation code. Thus apart from the instruction types "read" and "write" an instruction type "no operation" can also be used. Such an instruction type is necessary if no complete ATM cell can be filled with instructions. Furthermore, one operation code remains for future applications.

Since in addition it makes sense if an ATM cell sensibly transports instructions for several spatially adjacent devices, one space has been provided for identifying an addressed device. According to the UTOPIA Level 2 specification, up to 31 interface units can be addressed by one data interface so that up to 5 bits are required for identification. However, for the time being an



identification space of 3 bits is adequate because at present, for reasons of space, no more than 8 interface units can be accommodated on one card. In order to fully take into account future extensions, 2 reserve bits can be included. By providing 3 bits for the identification space, an ATM cell according to the invention is generally suitable for communication with 8 freely selectable devices which comprise registers.

In addition, each instruction block of the ATM cell according to the invention comprises an address field for allocation of certain memory locations within the particular device. UTOPIA level 2 specifications prescribe 12 bits for the register addresses so that the entire register contents of a PHY can be addressed with an address field of 12 bits. If according to an advantageous embodiment of the ATM cell a size of 17 bits is provided for the address field, then apart from the entire register contents, a substantial memory area can also be made accessible, e.g. for addressing memory modules.

Eventually, for each of the 11 instruction blocks provided, the ATM cell according to the invention provides an area for management data. According to a preferred allocation of the spaces of the ATM cell, it is provided for each of the data fields to be one byte in size. In this way, conversion of the data into the format required for the UTOPIA parallel management interface can be simplified.

A space for identifying the cell type is reserved for the supplementary block of the ATM cell according to the invention, with 1 bit being sufficient for this. In this space, the management unit can carry out identification

of an ATM cell to be transmitted, with such identification providing information whether this ATM cell is a new cell or a repetition cell. Thus for example when using a bit as a reserved space, in the case of repetition, the bit can be set to "1".

The provided sequential bit is toggled with each new cell. By contrast, in the case of a repetition cell, the sequential bit set is the same as that of the original cell. In this way the sequential bit can be used for evaluation in the case of faulty transmission being detected, as will become clear later on.

In addition a further space of for example 5 bits can be planned in as a reserve.

Many interface units, in particular many PHYs support an interrupt line to be able to signal special events such as an alarm. To meet the purpose of the interrupt lines, the software needs to poll such units to be able to react accordingly if no direct interrupt signalling is possible. The task of the software is simplified if the entire situation of the interrupt requirements of the units connected to the control unit is monitored. For this reason, the supplementary block of the ATM cell according to the invention comprises an interrupt field. This field can be updated with each new ATM cell which is transmitted. With an identification space of the addressed units of 3 bits, the interrupt field preferably comprises 8 bits so that an interrupt field in the supplementary block can be allocated to each of the 8 addressable units according to the allocation of the values in the identification area. In addition, the 5 reserve bits of the supplementary block can be used for future expansion of the interrupt field.

As there is always the possibility of errors occurring during transmission of a message, some check of corruptions should exist. For this reason an area of the supplementary block has been set aside for a checksum. After receipt of a new ATM cell, both the management unit and the control unit can thus carry out a checksum verification and discard the cell if the check indicates an incorrect transmission. The checksum is in particular formed across the entire payload.

In a preferred embodiment of the ATM cell according to the invention, prior to transmission of each cell a CRC-10 remainder is appended to each cell as the last 10 bits. In order to simplify the hardware design, the checksum is formed across all bytes of the payload except for the last 2 bytes of the supplementary block, i.e. across a total of 46 bytes. Thus 6 bits of the supplementary block (2 bytes minus 10 bit checksum) are not protected from corruption. In respect of the algorithm used it is assumed that these 6 bits are constantly set to "0", but the algorithm can be freely available.

Preferably a big-endian sequence is used for the payload area of the ATM cell according to the invention, so that the last byte of the 48 byte payload is the low-order byte of the twelfth 32-bit word of the payload. But it is also possible to select the "little endian" sequence.

The use of the first process according to the invention or control unit according to the invention or the ATM cell according to the invention, is particularly advantageous for configuring interface units which represent access to the physical layers. But it is

exactly such interface units where the invention can also be used for regular acquisition of performance data and statistical data of the interface unit, by way of the control unit, by using the second process according to the invention. To do so, it is always the same instruction set which is used.

Further advantageous embodiments of the invention are described in the dependent claims.

Below, the invention is described in more detail by means of embodiments referring to drawings. The following are shown:

Fig. 1: the ATM reference model;

Fig. 2: the integration of a control unit according to the invention, in an ATM network;

Fig. 3: the ATM cell format used;

Fig. 4a: the bit division, according to the invention, of the instruction blocks; and

Fig. 4b: the bit division, according to the invention, of the supplementary block.

A reference to Figure 1 has already been provided in the introduction.

Figure 2 shows part of a typical ATM network environment. A management unit 1 as well as interface units (PHY) 4 integrated in a line card 3, of the physical layer, form part of an ATM network, respectively. The "cloud" 2 shown

represents the layers ATM, AAL and "higher layers" of the network.

The management unit 1 comprises a timer.

By way of a Utopia data path interface 7, the interface units 4 have access to an ATM layer device (not shown) of the ATM network 2. Furthermore, the interface units 4 comprise a management interface 6. The path of the user data, from the interface units to the transmission medium, is indicated by dotted lines 8.

In addition to these elements, a control unit 5 (CLIC: control link circuit) has been provided which together with the interface units 4 is integrated in the line card 3. The control unit 5 is also connected to the Utopia data path interface 7 as well as with the management interface 6 of the interface units 4. There is also an intermediate memory (not shown) of the control unit 5.

The management unit 1 provides management data for the interface units 4. The management data comprises instructions to be carried out, with each instruction being associated with a particular interface unit 4. From the management unit 1 to the respective control unit 4, this management information is to take the same path through the network as does the ATM-user data flow. The management information thus needs to be packed into ATM cells with addressing to the respective control unit contained in the cell header. With each ATM entity to traverse, the next path section is determined from the cell header information and the cell is forwarded along said path section via the transmission medium, until it reaches the ATM entity with the addressed control unit 5.

From the point of view of the ATM, the control unit 5 behaves like an interface unit 4 which is accessible via a data path interface 7.

The control unit 5 is able to detect ATM cells addressed to it. If such a line comes in, the control unit 5 takes the data from the cell, evaluates the information received and carries out the intended instructions via the management interfaces 6.

The management unit can have access to the OAM cell stream and can thus generate CLIC cells from OAM cells, or it can generate OAM cells from the data collected via inband protocol by the PHYs, and it can send these cells to other management units via the ATM-network.

The actions requested via the instructions can in part consist of the setting of certain registers of a particular interface unit 4, or of the values of the registers of the interface unit 4 being read-out.

Figure 3 shows the general structure of an ATM cell used for management information; hereafter it will be referred to as a CLIC cell.

Like every ATM cell, the CLIC cell too comprises a cell header of 5 bytes and a payload space of 48 bytes with the cell header among other things comprising information concerning the path (VPI/VCI).

In a CLIC cell, the payload space is divided into 11 instruction blocks of 4 bytes each as well as a supplementary block (trailer) of 4 bytes. With every instruction block, a single instruction can be transmitted.

Figure 4a shows the structure of the 4-byte instruction blocks; said structure always remains the same. The bits of the instruction block shown are consecutively numbered from 0 to 31.

Bits 30 and 31 (OP) are reserved for the entry of an operation code. By way of possible operation codes, the following have been provided: '00' for "no operation" (NOP), '01' for "read", '10' for "write". Code '11' is kept free.

Bits 28 and 29 (R) have been kept free in reserve.

Three bits (25 - 27) have been provided as "device select" bits DS for identification of the interface unit 4 to which the instruction block relates. Thus up to eight interface units 4 can be configured by the control unit 5.

Furthermore, the bits 8 - 24 are for the register addresses of the addressed interface unit 4. With these 17 bits, all registers of an interface unit 4 can be allocated individually.

Finally, one byte (bits 0 - 7) has been provided for the data which provides the basis for carrying out instructions.

Figure 4b shows the structure of the supplementary block of the CLIC cell which in the payload space adjoins the 11 instruction blocks. The supplementary block also comprises 4 bytes.

Bit 31 is used for setting a cell type identification (flag). If this bit is not set, the CLIC cell is a new cell. By contrast, if it is set, the cell is a cell sent again.

A sequential bit (bit 30) adjoins the bit for the cell type. This bit is toggled from one cell to the next, except in the case of a repetition cell. In the case of a repetition cell, the value of the last sequential bit is repeated, too.

Bits 24 - 29 are kept in reserve. 8 bits (16 - 23) for interrupts (int0 - int7) follow the maximum of eight interface units 4. It makes sense if allocation of the interrupts int0 - int7 corresponds with allocation of the interface units for the values 1 - 8, which can be set via the 3 bit DS field. If the condition of further interrupts is to be monitored, then the six reserve bits can be used for this purpose.

The bits 10 - 15 of the supplementary block are constantly set to '0'.

A 10 bit checksum (CRC 10) can be inserted into the last bits 0 - 9 of the supplementary block and thus also the CLIC cell.

According to the invention, the division of the CLIC cells provided according to Figures 3 and 4 not only makes it possible to exchange instructions by means of "in-band" transmission between a management unit 1 and interface units 4, but it also makes it possible to provide a reliable process if errors occur.



The process used is a request-response process. After the instructions received have been carried out, each cell sent from the management unit 1 to the control unit 5 is sent back to the management unit 1 in a modified form. In this way, the management unit 1 receives confirmation that the instructions were able to be processed by the control unit 5. In addition, the results of "read" instructions can be introduced to these response cells, said instructions having resulted from the reading of data, by the control unit 5, from the registers of the addressed interface units 4.

Both in respect of the request cell of the management unit 1 and in respect of the response cell of the control unit 5, a checksum is determined and deposited in the last 10 bits of the supplementary block, before the CLIC cell is transmitted. The polynomial  $x^{10} + x^9 + x^5 + x^4 + x + 1$  is used to determine the checksum (CRC 10 remainder). This polynomial is for example also provided for in the ATM-OAM specifications (ITU-T I.610, "Common OAM cell fields" p. 27). The checksum is formed across all bytes of the payload except for the last 2 bytes of the supplementary block, i.e. the area assumed to be set to '0' and the checksum area itself. When the CLIC cell is received in the management unit 1 or in the control unit 5, this checksum is first compared with a sum formed anew in the reception unit via the payload. Further processing will only take place if there is agreement; otherwise the cell is discarded.

The timer of the management unit 1 and the memory of the control unit 5 are provided as a safeguard in case processing of the instructions is not successful or in case of faulty transmission of a CLIC cell. The timer of the management unit 1 is always started when a CLIC cell

is put out. By means of the timer it is thus possible to monitor whether a specified time limit, between transmission of the CLIC cell to receiving a response cell, has been exceeded.

This time limit can be reached if monitoring of the checksum has shown an error either by the management unit 1 or by the control unit 5, and if the CLIC cell concerned was discarded. In this case the management unit 1 resends the last CLIC cell, while maintaining the last-used value of the sequential bit. This indicates that the cell is a repetition cell, because the bit of the cell type recognition (bit 31) of the supplementary block is set to '1'. If the control unit 5 detects that the cell type bit has been set, then it compares the status of the sequential bit of the CLIC cell received with that of the preceding CLIC cell, which has been stored in the intermediate memory of the control unit 5.

If the sequential bits are different, this indicates an error detection on the receiving side and cell discarding during checksum verification in the control unit 5. Thus the CLIC cell has not yet been processed by the control unit 5. The commands of the repetition cell are carried out as if it were a new CLIC cell. Also, a response cell is regularly formed and transmitted to the management unit 1.

By contrast, if the sequential bits are identical, this indicates an error detection on the receiving end and cell discarding during checksum verification in the management unit 1. It is thus assumed that correct implementation of the instructions of the cell has already taken place, with the response cell having been lost on the way back to the management unit 1. In this

case only the content of the intermediate memory in the control unit 5 is read out and sent back to the management unit 1.

Reading from the intermediate memory is necessary because the cell transmitted to the management unit 1 also contains data read out from the interface units 4, for example performance data, corresponding to a current counter state in the interface unit 4. As soon as such a counter value has been read out, usually the interface unit 4 resets the counter. In the case of renewed read-out of the register values which represent the counter status, the new counter status would be transmitted for a regular new creation of a response cell, and thus from the point of view of allocation, an incorrect value would be transmitted to the management unit 1.

Exceeding the time limit can also occur if a cell has been delayed in a data jam. In such a case the response cell may arrive late in the management unit 1, after the repetition cell has already been dispatched, so that subsequently a further response cell 5 is received by the control unit. The management unit 1 is thus able to differentiate which cells have been received. One of the two cells can then be discarded since both cells have the same content.

CLAIMS

1. A process for writing data into registers of at least one device (4) comprising a management interface (6), characterised by the following steps:
  - composing ATM cells by at least one management unit (1), with the management unit (1) addressing the ATM cells in each instance to a control unit (5) linked to a data path interface (7), and integration of instructions associated with particular devices (4), e.g. writing of data into the registers of the devices (4), in the form of an operation code, together with the respective information into the payload of the ATM cells;
  - transmitting the ATM cells to the addressed control unit (5) via the respective data path interface (7);
  - extracting the operation codes being associated with particular devices (4), and the associated information in the control unit (5) contained in the payload of the ATM cell; and
  - if after the operation code, data is to be entered, setting of the register values of the devices (4) according to the information provided from the ATM cell for this.

2. A process for reading values from registers of a device (4) comprising a management interface (6), characterised by the following steps:
  - composing ATM cells by at least one management unit (1), with the management unit (1) addressing the ATM cells in each instance to a control unit (5) linked to a data path interface (7), and integrating instructions associated with particular devices (4), e.g. reading of data from the registers of the devices (4), in the form of an operation code, together with the respective information into the payload of the ATM cells;
  - transmitting the ATM cells to the addressed control unit (5) via the respective data path interface (7);
  - extracting the operation codes being associated with particular devices (4), and the associated information in the control unit (5) contained in the payload of the ATM cell; and
  - if after the operation code, register values are to be read out from devices (4), reading of the register values of the respective devices (4), integration of the read values into ATM cells with addressing to the management unit (1) and transmission of the cells to the management unit (1).
3. A process according to claim 1 or 2, characterised in that the devices (4) are ATM interface units of the physical layer by means of which a data path

interface (7), in particular UTOPIA, provides access for the ATM layer to a physical transmission medium.

4. A process according to one of the preceding claims, characterised in that addressing of ATM cells to the control unit (5) by the management unit (1) takes place via a VPI/VCI address associated with the control unit (5), or if the management unit (1) communicates directly with the control unit (5), via an UTOPIA data interface (7), addressing takes place via a reserved UTOPIA bus address of the data interface (7).
5. A process according to one of the preceding claims, characterised in that addressing of ATM cells to the management unit (1) by the control unit (5) takes place via a VPI/VCI address associated with the management unit (1), or if the management unit (1) communicates directly with the control unit (5), via a UTOPIA data interface (7), addressing takes place via a reserved UTOPIA bus address of the data interface (7).
6. A process according to one of the preceding claims, characterised in that transmission of the ATM cells is based on the request-response protocol.
7. A process according to claim 6, characterised in that the management unit (1) does not send any further ATM cells to a control unit (5) as long as it has not received a correct response to the preceding ATM cell from said control unit (5), or as long as a time limit has not been exceeded.

8. A process according to one of the preceding claims, characterised in that prior to any forwarding of ATM cells destined for the management unit (1), the control unit (5) forms a checksum, and prior to any forwarding of ATM cells destined for a control unit (5), the management unit (1) forms a checksum, across at least part of the payload of the ATM cell, in particular a CRC-10 sum, and integrates this sum into the ATM cell to be transmitted.
9. A process according to one of the preceding claims, characterised in that prior to carrying out any instructions, the control unit (5) checks a checksum transmitted with the ATM cell received, and carries out the instructions only if no transmission error is detected; otherwise it discards the ATM cell and is ready to receive new ATM cells.
10. A process according to claim 9, characterised in that after each processing of the instructions of an ATM cell, the control unit (5) places at least part of the updated content of the cell to be transmitted to a management unit, in particular the updated content of the entire cell, into an intermediate memory.
11. A process according to one of claims 8 - 10, characterised in that - after a specified time limit after sending a first ATM cell addressed to a control unit (5) has lapsed and prior to receiving a response ATM cell from the control unit (5) with a correct CRC sum,

the management unit (1) sends the same ATM cell again, identifying it as a repetition cell;

- when receiving a repetition cell, the control unit (5) checks whether or not, following the first ATM cell, a response ATM cell was transmitted to the management unit (1); and
- if no, processes the instructions contained in the cell; or
- if yes, retransmits the response ATM cell which has already been sent once and which has been stored separately, to the management unit (1).

12. A process according to one of the preceding claims, characterised in that for each ATM cell to be composed, the control unit (5) maps the current interrupt state of the connected devices (4) into interrupt bits provided for this purpose in the payload of the ATM cell.
13. A process according to one of the preceding claims, characterised in that the control unit (5) autonomously and regularly reads in data from devices (4) connected to it and transmits such data, integrated into ATM cells, to the management unit (1).
14. A control unit (5) providing access to the management interface (1) of at least one device (4) comprising registers as well as to a data path interface (7) of an ATM network, with the control unit (5) being suitable for receiving ATM cells composed by a management unit (1) and destined for



the control unit (5) via the data path interface (7), and extracting and carrying out individual instructions associated with a particular device (4), in particular reading and/or writing of register data into the devices (4) or from the devices (4) from the payload of these cells and extracting them and carrying them out in respect of the respective device (4).

15. A control unit (5) according to claim 14, characterised in that the management interface (6) corresponds to the management interface proposed in Appendix 2 of Utopia Level 2.
16. A control unit (5) according to claim 14 or 15, characterised in that the data path interface (7) corresponds to the data path interface specified in Appendix 2 of Utopia Level 2.
17. A control unit (5) according to one of claims 14 - 16 characterised in that it is suitable for composing the register data read from the registers of the devices (4) to become ATM cells, address it to a management unit (1) by means of the VPI/VCI address of the management unit (1), or address it using a UTOPIA address reserved for inband communication, and forward it to the data path interface (7).

18. A control unit (5) according to claim 17,  
c h a r a c t e r i s e d i n t h a t  
it comprises an intermediate memory for storing at  
least part of the content of the ATM cell to be  
transmitted to the management unit (1).
19. A management system for an ATM network for  
configuring and/or monitoring devices (4) comprising  
registers and a management interface (6),  
respectively, with the management system comprising  
control units (5) according to one of claims 14 -  
18, as well as at least one management unit (1)  
suitable for generating configuration data for the  
devices (4) and/or for processing the data available  
from the registers of the devices (4), with the  
management unit (1) being suitable for generating  
instructions for a particular device (4)  
respectively, for joining instructions and data for  
one or several devices (4) to which the same control  
unit (5) has access, as a payload of an ATM cell and  
for addressing the ATM cell to the respective  
control unit (5).
20. A management system according to claim 19,  
c h a r a c t e r i s e d i n t h a t  
the devices (4) comprising registers are connected  
to a unit of the ATM layer of the ATM network via  
the data path interface (7).
21. A management system according to claim 19 or 20,  
c h a r a c t e r i s e d i n t h a t  
the devices (4) comprising registers are ATM  
interface units of the physical layer, in particular  
PHYs, by way of which the ATM layer of the ATM

network has access to at least one transmission medium.

22. A management system according to claim 21, characterised in that the control unit (5) has access to management interfaces (6) of up to 31 interface units (4).
23. An ATM cell comprising cell header of 5 bytes and a payload space of 48 bytes, said cell being used for transmitting management data between a management unit (1) with access to an ATM network and at least one device (4), with said device (4) comprising registers into which data is to be written and/or from which data is to be read out, and a management interface (6) by way of which a control unit (5) has access to the registers of the device (4), with the control unit (5) furthermore having access to a data path interface (7) of an ATM network, and being suitable for receiving certain ATM cells composed by a management unit (1) via the data path interface (7), said data being destined for the control unit (5), and from the payload of these cells to extract individual instructions associated with a particular device (4), in particular reading and/or writing of register data into the devices (4) or from the devices (4), and to extract associated information and carry it out in respect of the particular device (4), with the payload space of the ATM cell comprising instruction blocks in which respective bits are provided
  - for an operation code which identifies an instruction type such as read, write, no operation;

- for identification of a device (4) to which the instruction in the instruction block is directed;
- which are associated with particular registers integrated in the identified device (4); and
- for data required for carrying out the instruction,

and a supplementary block (trailer), in which bits are provided

- for identifying the cell type, such as new cell or a retransmitted cell;
- as a sequential bit which is toggled with each composition of a new cell which does not constitute a repetition;
- for interrupt information; as well as
- for a checksum.

24. An ATM cell according to claim 23,  
c h a r a c t e r i s e d   i n   t h a t  
11 instruction blocks and a supplementary block of 4  
bytes each are used in each payload space.

25. An ATM cell according to claim 24,  
c h a r a c t e r i s e d   i n   t h a t  
for each of the 11 instruction blocks the following  
are provided

- for the operation code 2 bits;

- for identification of the device (4) 3 - 5 bits and, supplementing to 5 bits for reserve, 0 - 2 bits;
- for allocation of the registers 17 bits;
- for the data required to carry out a respective instruction 1 byte;

and that for the supplementary block the following are provided

- for identification of the cell type 1 bit;
- as a sequential bit 1 bit;
- additionally as a reserve 5 bits;
- for the interrupt information 1 byte; and
- for the checksum, formed by a cyclic redundancy check (CRC), 10 bits.

26. An ATM cell according to one of claims 23 - 25, characterised in that a "big endian order" is used.
27. The use of an ATM cell according to one of claims 23 - 26 for configuring ATM interface units (4) of the physical layer.
28. The use of an ATM cell according to one of claims 23 - 26 for the reading out of data, available in the

ATM interface units (4) of the physical layer, in particular register values.

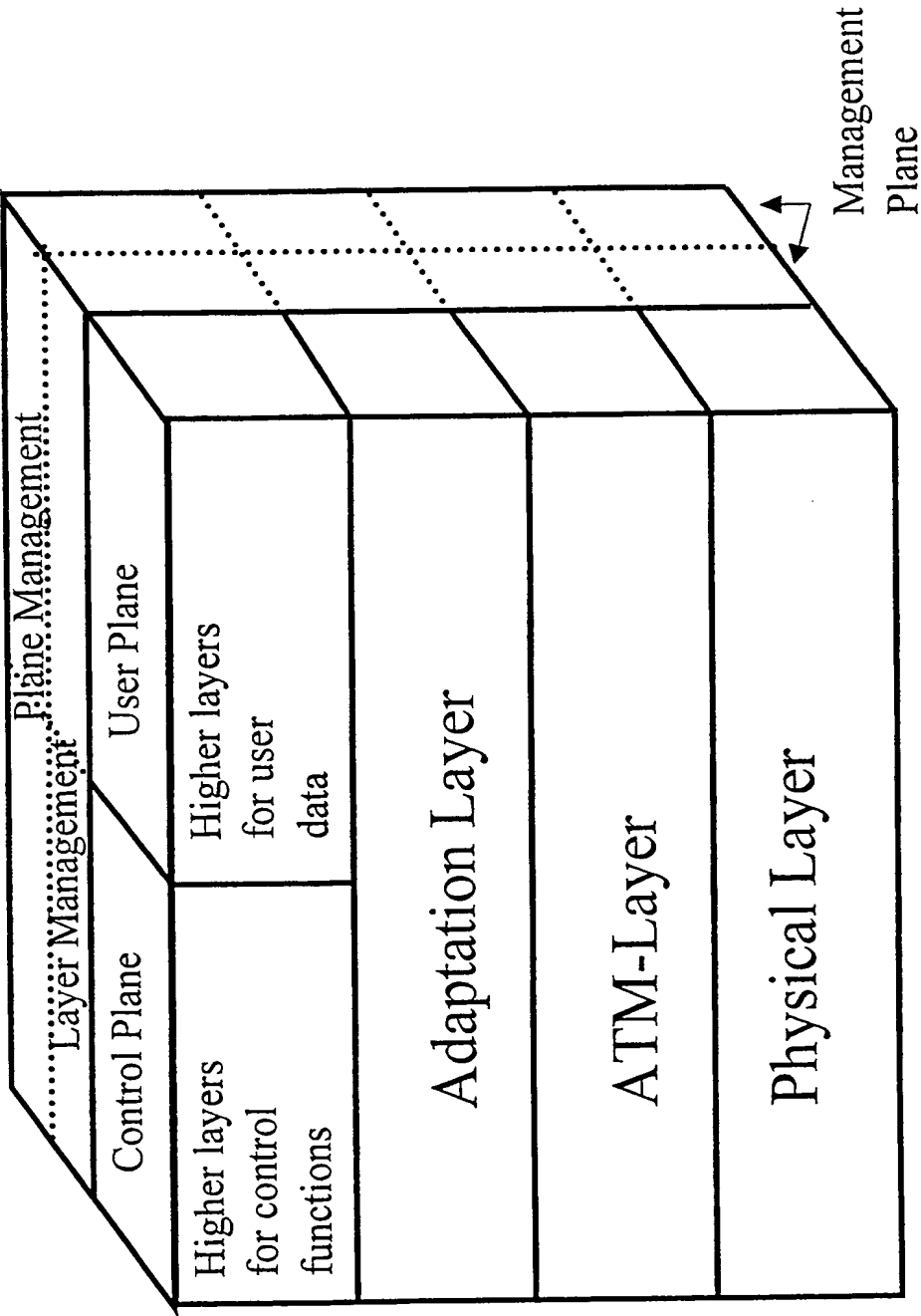


Fig. 1

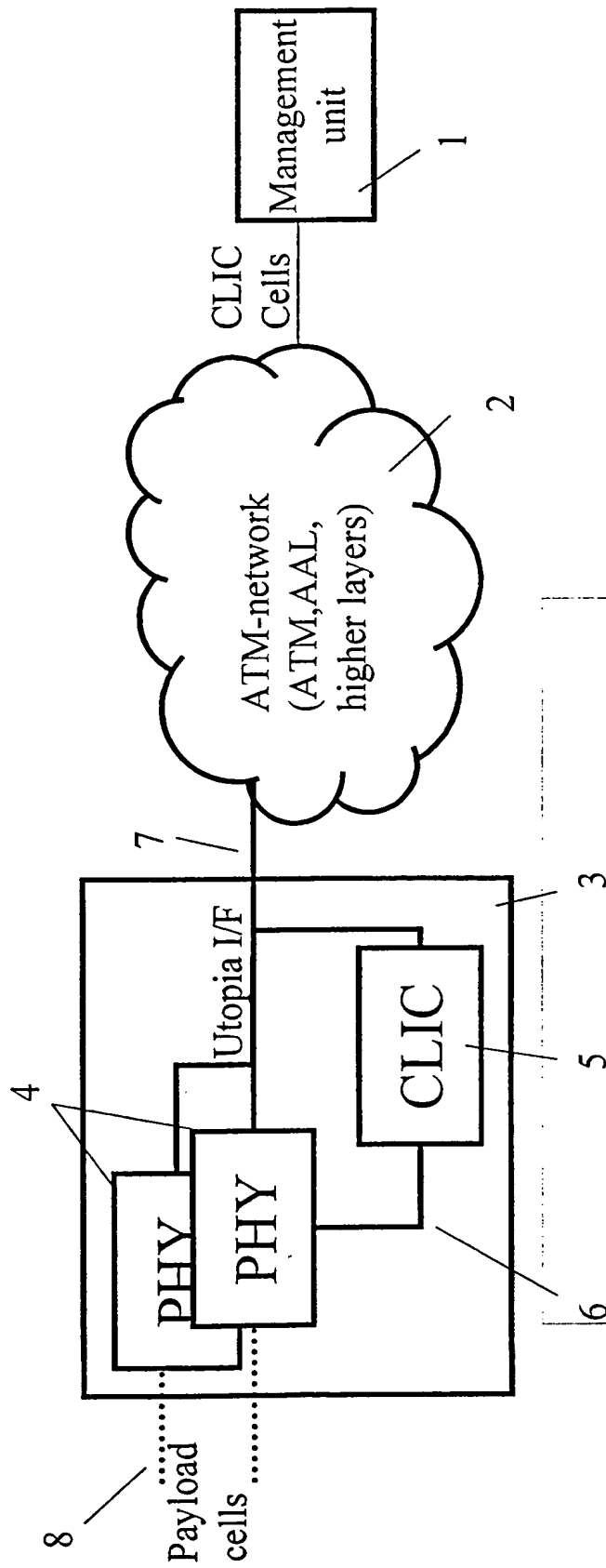


Fig. 2



| - Byte - | -Byte- | -Byte- | -Byte- | - Byte-

ATM cell header	HEC
Instruction word 1	
Instruction word 2	
Instruction word 3	
Instruction word 4	
Instruction word 5	
Instruction word 6	
Instruction word 7	
Instruction word 8	
Instruction word 9	
Instruction word 10	
Instruction word 11	
Supplementary word	

**FIG. 3**

4 / 4

: — Byte n — : — Byte n + 1 — : — Byte n + 2 — : — Byte n + 3 — :

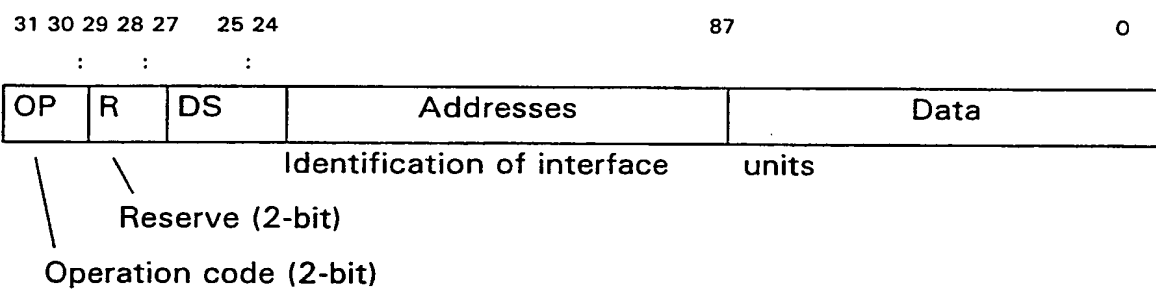


FIG. 4a

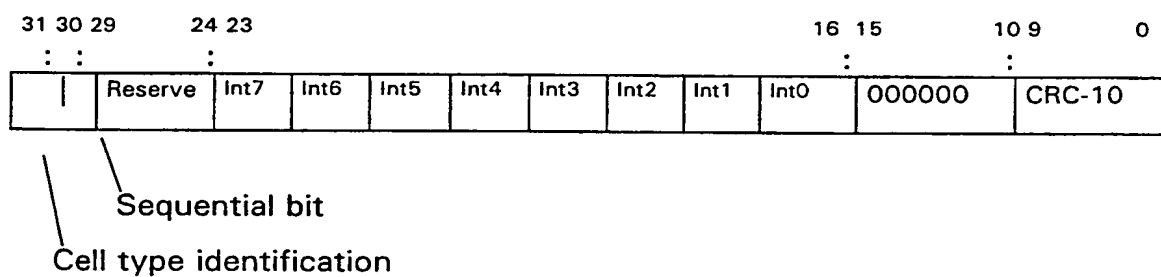


FIG. 4b

# INTERNATIONAL SEARCH REPORT

Ir. XXXXXXXXXX al Application No  
PCT/EP 00/00116

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H04Q11/04

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 812 550 A (DOH YOON MI ET AL) 22 September 1998 (1998-09-22)  column 5, line 12 -column 9, line 11 -----	1,2,14, 19,23, 27,28

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

15 May 2000

Date of mailing of the international search report

23/05/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Lindner, A

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

In. Application No  
**PCT/EP 00/00116**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5812550 A	22-09-1998	KR 157152 B	16-11-1998
		JP 2837660 B	16-12-1998
		JP 9200230 A	31-07-1997
<hr/>			

COHAUSZ & FLORACK • P.O. Box 33 02 29 • D-40435 Düsseldorf

Europäisches Patentamt  
Erhardtstr. 27

80331 München

**Patentanwälte**

Dipl.-Ing. Rudolf Knauf  
Dr.-Ing. Ralph Schippan  
Dipl.-Ing. Andreas Thielmann  
Dr. rer. nat. Ralph Minderop  
Dipl.-Ing. Johannes Simons  
Dipl.-Ing. Hans-Joachim Meyer\*  
Dipl.-Phys. Gottfried Schüll  
Dr. rer. nat. Thomas Rox  
Dipl.-Ing. Alexandra Weyres  
Dr. rer. nat. Arwed Burrichter

**Rechtsanwälte**

Erik Schäfer  
Ulrike Alice Ulrich

Düsseldorf 11.01.2001

Your ref.

Our ref. SC/wy 981040WO

International Patent Application PCT/EP00/00116  
Nokia Networks Oy

In response to the Written Opinion dated October 16, 2000 relating to the above identified patent application, new claims 27 to 36 are filed that are to substitute the originally filed claims 27 to 28.

New claim 27 is directed to a method for constructing an ATM-cell as defined in original claim 23. The original disclosure for such a process can be found in the combined view of page 16, paragraph 5; page 17, paragraph 7; and page 18, paragraph 1 to page 19 paragraph 5.

New claims 28 to 30 are dependent on new claim 27 and correspond to originally filed claims 22-26.

New claim 31 is directed to a management unit for constructing an ATM-cell as defined in original claim 23. The original disclosure for such a management unit can be found in the combined view of page 16, paragraph 5; page 17, paragraph 7; and page 18, paragraph 1 to page 19 paragraph 5.

New claims 32 to 34 are dependent on new claim 31 and correspond to originally filed claims 22-26.

New claims 35, 36 correspond to originally filed claims 27, 28.

Original claim 23 directed to an ATM cell is kept in spite of the objections by the Examiner. It is respectfully requested to consider the following arguments with regard to this claim:

Rule 67.1(v) PCT excludes the representation of information from patentability. However, the applicant does not consider the claimed ATM cell to fall under this Rule.

Rule 67.1(v) PCT corresponds to Art. 52(2) d) EPC. This article is explained in more detail in the Guidelines for Examination in the EPO, C-IV 2.3, "Presentation of information". It is stated in this section i.a. that "the arrangement of representation, as distinguished from the information content, may well constitute a patentable technical feature."

In the present invention, it is not the content of information but a specific arrangement of different types of information in an ATM-cell that is claimed. In general, information that can be used for updating the registers of a device is included in the payload of an ATM cell, which constitutes already a specific arrangement of information. More precisely and as further detailed arrangement, a certain type of information enabling the required updating of specific registers in a specific device is included in an instruction block of the payload of the ATM cell; and another type of information, that is supplementary control information, is included in a supplementary block in the payload. Exactly this arrangement of information in the payload of an ATM-cell can be used advantageously in the mentioned device for updating the registers of said device, regardless of the concrete contents of information. Actually, the content of the information has to be varying for enabling an efficient updating of registers. The presented distribution of information in the ATM-cells enables the inexpensive updating of registers the invention aims at. Therefore, the claimed ATM cell presents together with the intended use included in the claim - i.e. updating of the contents of registers - a technical feature and should not be considered to be excluded from patentability by Rule 67.1(v) PCT.

The only document cited in the International Search Report, US 5,812,550, describes an asynchronous transfer mode layer function processing apparatus. The general structure of an ATM cell is mentioned in column 1, lines 27-32.

The inclusion of information used for the updating of registers in a device in the payload of an ATM cell, and far less the specific arrangement of this information in the payload as specified in claim 23, 27 and 31 is neither mentioned nor suggested in the document. Claims 23 to 34 are therefore new and based on an inventive step. The industrial applicability of the subject matter of the claims is considered to be obvious.

The application does not intent to amend the text of the specification during the international stage.

A handwritten signature in black ink, consisting of a stylized 'R' followed by a large, sweeping loop.

Dr. Ralph Schippan  
Patent Attorney (24)

Encl.

New Claims 27 to 36 (January 11, 2001)

27. A method for constructing an ATM cell comprising a cell header of 5 bytes and a payload space of 48 bytes, said cell being used for transmitting management data between a management unit (1) with access to an ATM network and at least one device (4), with said device (4) comprising registers into which data is to be written and/or from which data is to be read out, and a management interface (6) by way of which a control unit (5) has access to the registers of the device (4), with the control unit (5) furthermore having access to a data path interface (7) of an ATM network, and being suitable for receiving certain ATM cells composed by a management unit (1) via the data path interface (7), said data being destined for the control unit (5), and from the payload of these cells to extract individual instructions associated with a particular device (4), in particular reading and/or writing of register data into the devices (4) or from the devices (4), and to extract associated information and carry it out in respect of the particular device (4), with the payload space of the ATM cell comprising instruction blocks and a supplementary block (trailer), the method comprising the steps of:

- inserting into the instruction blocks bits for an operation code which identifies an instruction type such as read, write, no operation;



- inserting into the instruction blocks bits for identification of a device (4) to which the instruction in the instruction block is directed;
- inserting into the instruction blocks bits which are associated with particular registers integrated in the identified device (4);
- inserting into the instruction blocks bits for data required for carrying out the instruction,
- inserting into the supplementary block bits for identifying the cell type, such as new cell or a retransmitted cell;
- inserting into the supplementary block a sequential bit which is toggled with each composition of a new cell which does not constitute a repetition;
- inserting into the supplementary block bits for interrupt information; and
- inserting in the supplementary block bits for a checksum.

28. A method according to claim 27,  
c h a r a c t e r i s e d i n t h a t  
11 instruction blocks and a supplementary block of 4  
bytes each are used in each payload space for  
inserting the bits.

29. A method according to claim 28,

c h a r a c t e r i s e d i n t h a t  
into the 11 instruction blocks the following number  
of bits are inserted:

- for the operation code 2 bits;
- for identification of the device (4) 3 - 5 bits  
and, supplementing to 5 bits for reserve, 0 - 2  
bits;
- for allocation of the registers 17 bits;
- for the data required to carry out a respective  
instruction 1 byte;

and that into the supplementary block, the following  
number of bits are inserted:

- for identification of the cell type 1 bit;
- as a sequential bit 1 bit;
- additionally as a reserve 5 bits;
- for the interrupt information 1 byte; and
- for the checksum, formed by a cyclic redundancy  
check (CRC), 10 bits.

30. A method according to one of claims 27 - 29,  
c h a r a c t e r i s e d i n t h a t  
a "big endian order" is used for the ATM cell.

31. A management unit for constructing an ATM cell comprising a cell header of 5 bytes and a payload space of 48 bytes, said cell being used for transmitting management data between said management unit (1) with access to an ATM network and at least one device (4), with said device (4) comprising registers into which data is to be written and/or from which data is to be read out, and a management interface (6) by way of which a control unit (5) has access to the registers of the device (4), with the control unit (5) furthermore having access to a data path interface (7) of an ATM network, and being suitable for receiving certain ATM cells composed by a management unit (1) via the data path interface (7), said data being destined for the control unit (5), and from the payload of these cells to extract individual instructions associated with a particular device (4), in particular reading and/or writing of register data into the devices (4) or from the devices (4), and to extract associated information and carry it out in respect of the particular device (4), with the payload space of the ATM cell comprising instruction blocks and a supplementary block (trailer), the management unit (1) comprising means for:

- inserting into the instruction blocks bits for an operation code which identifies an instruction type such as read, write, no operation;
- inserting into the instruction blocks bits for identification of a device (4) to which the instruction in the instruction block is directed;

- inserting into the instruction blocks bits which are associated with particular registers integrated in the identified device (4);
  - inserting into the instruction blocks bits for data required for carrying out the instruction,
  - inserting into the supplementary block bits for identifying the cell type, such as new cell or a retransmitted cell;
  - inserting into the supplementary block a sequential bit which is toggled with each composition of a new cell which does not constitute a repetition;
  - inserting into the supplementary block bits for interrupt information; and for
  - inserting into the supplementary block bits for a checksum.
32. A management unit according to claim 31,  
c h a r a c t e r i s e d i n t h a t  
the means are suited to insert said bits into 11  
instruction blocks and a supplementary block of 4  
bytes each in each payload space.
33. Management unit according to claim 32,  
c h a r a c t e r i s e d i n t h a t  
the means are suited for inserting into the 11  
instruction blocks:

- for the operation code 2 bits;
- for identification of the device (4) 3 - 5 bits  
and, supplementing to 5 bits for reserve, 0 - 2  
bits;
- for allocation of the registers 17 bits;
- for the data required to carry out a respective  
instruction 1 byte;

and that the means are suited for inserting into the  
supplementary block:

- for identification of the cell type 1 bit;
- as a sequential bit 1 bit;
- additionally as a reserve 5 bits;
- for the interrupt information 1 byte; and
- for the checksum, formed by a cyclic redundancy  
check (CRC), 10 bits.

34. Management unit according to one of claims 31 - 33,  
c h a r a c t e r i s e d i n t h a t  
the means are suited for using a "big endian order".
35. The use of an ATM cell according to one of claims 23  
- 34 for configuring ATM interface units (4) of the  
physical layer.

36. The use of an ATM cell according to one of claims 23 - 34 for the reading out of data, available in the ATM interface units (4) of the physical layer, in particular register values.

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Patent- und Rechtsanwälte

COHAUSZ & FLORACK • Postfach 33 02 29 • D-40435 Düsseldorf

Europäisches Patentamt  
Erhardtstr. 27

80331 München

**Patentanwälte**

Dipl.-Ing. Rudolf Knauf  
Dr.-Ing. Ralph Schippan  
Dipl.-Ing. Andreas Thielmann  
Dr. rer. nat. Ralph Minderop  
Dipl.-Ing. Johannes Simons  
Dipl.-Ing. Hans-Joachim Meyer  
Dipl.-Phys. Gottfried Schüll  
Dr. rer. nat. Thomas Rox

**Rechtsanwälte**

Erik Schäfer  
Ulrike Alice Ulrich

Düsseldorf 19. Januar 2000

Ihr Zeichen

Unser Zeichen SC/wa. 981040WO

Internationale Patentanmeldung PCT/EP00/00116  
Nokia Networks Oy

It is kindly requested to: change the address of the applicant/inventor  
Hubertus STORCK as follows:

Füllenbachstr. 5  
D-40474 Düsseldorf



Dr. Ralph Schippan